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This programed mathematics textbook is for student use in vocational education courses. It was developed as part of a programed series covering 21 mathematical competencies which were identified by clusters. The development of a sequential content structure was also based on these mathematics competencies. After completion of this program the student should be able to solve equations of the form a=bc for any one letter, given positive integral values for the other two. The material is to be used by individual students under teacher supervision. Twenty-six other programed texts and an introductory volume are available as VT 006 882-VT 006 909, and VT 006 975. (EM)

FINAL REPORT
Project No. 0E7-0031
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Report No. 16-0

Occupational Mathematics

SOLUTIONS OF A = BC

June 1968

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Occupational Mathematics

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June 1968

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State Coordinating Council for Occupational Education, Olympia, Washington

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OBJECTIVES

1. The student should be able to solve equations of the form a = bc for any one letter given positive integral values for the other two.

PREREQUISITES: Unit 13

Greetings! You are about to begin improving your knowledge of basic mathematics. There are many important uses for the mathematics you are learning.

This booklet is not like your ordinary books. It is designed to help you learn as an individual. On the following pages you will find some information about mathematics. After the information is presented, you will be asked a question. Your answers to these questions will determine how you proceed through this booklet. When you have selected your answer to the question, turn to the page you are told to.

Do not write in this booklet. You may wish to have a pencil and some paper handy so you can write when you want to.

Remember this is not an ordinary book.

1. Study the material on the page.
2. Read the question on the page (you may want to restudy the material on the page).
3. Select the answer you believe is correct.
4. Turn to the page indicated by your answer.

Are you ready to begin?

(a) Yes — Turn to page 1

(b) No — Turn to page C

(c) HELP — Go see your teacher

Your answer was (b) No.

Well, this booklet is a little different.

Go back and read page B again. After you have read it, you will probably be ready to begin.

The work in this unit will be concerned with solving equations of the form a = bc. Solving equations of this type requires forming the <u>appropriate</u> <u>equivalent statement</u>.

For example, if a = 6/3, then solving for "a" we write the equivalent form of 6/3 which is 2. Thus, a = 2.

Also, if a = 9/3, then a = 3, the equivalent form of 9/3.

If a = 4 x 2, then a = 8, the equivalent form of 4 x 2.

If a = 3 x 6, then a = 18, the equivalent form of 3 x 6.

Now turn to page 2, and you try one.

Which of the below is the correct value for "a" in the equation a = 6/2?

(a) a = 2 Turn to page 9

(b) a = 3 Turn to page 5

(c) a = 1/3 Turn to page 7

No. You seem to be having trouble recognizing equivalent forms of numbers.

Go to Unit 3 page 1 and learn about equivalent forms of numbers.

After completing Unit 3, return to page 1 of this Unit.

Wait a minute! It isn't that difficult.

If 8/4 = a, then 2 = a

and

if a = 8/4, then a = 2.

Therefore, they are the same!

Ask your human teacher for help and then return to page 1 of this program.

Correct!

You saw that if a = 6/2, then a = 3. Thus, 3 = 6/2;
and you have formed a correct equivalent statement.

Try this one.

Is the value of "a" in 9 x 4 = a the same as the value of "a" in a = 9 x 4?

(a) Yes Turn to page 8

(b) No Turn to page 11

Good! a = 2.

You saw that if a = 12/6, then 2 = 12/6, a correct equivalent statement.

Try this one.

Question:

Is the value of "a" in 9 x 4 = a the same as the value of "a" in a = 9 x 4?

(a) Yes Turn to page 8

(b) No Turn to page 11

Oops! We are looking for the equivalent form of 6/2.

The equivalent form of 6/2 is 3.

Try another one.

What is the correct value for "a" in the equation

a = 12/6?

(a) 1/2 Turn to page 3

(b) 2 Turn to page 6

Good! You know that the unknown can appear on either the right or left-hand side of the equal sign. Thus, $a = 9 \times 4$ is the same as $9 \times 4 = a$.

Question:

For what value of "a" is $9 \times 4 = a$ and $a = 9 \times 4$ true?

(a)	36	Turn to page 10
(b)	27	Turn to page 13
(c)	45	Turn to page 18

Oops! We are looking for the equivalent form of 6/2.

The equivalent form of 6/2 is 3.

Try another one.

What is the correct value for "a" in the equation

a = 12/6?

(a) 1/2 Turn to page 3

(b) 2 Turn to page 6

Very good! $36 = 9 \times 4$ and $9 \times 4 = 36$, so $a = 36$.

Now turn to page 12, and we'll look at another type of equation.

Incorrect. Let's see why.

9 x 4 = a shows that 36 = a

a = 9 x 4 shows that a = 36

Since "a" equals 36 in both equations, the order doesn't make any difference.

Question:

The value for "a" in 8/4 = a and a = 8/4 is:

(a) the same value Turn to page 15

(b) not the same value Turn to page 4

To solve an equation such as 6 = 3 x b, we must find a number to replace the b which will make an equivalent statement. 2 is such a number since 6 = 3 x 2 is a correct statement. Thus, we can say b = 2. How do we find this number?

From the methods you have learned in Unit 13, we can write 6 = 3 x b as 6/3 = b since they are equivalent forms. Now solving, we see b = 2.

Now you try one.

In solving 4 x b = 12 for b, we rewrite the equation as:

(a) b = 4/12 and then as b = 1/3 Turn to page 20

(b) b = 12/4 and then as b = 3 Turn to page 14

Incorrect. The correct value for a = 9 x 4 and 9 x 4 = a is a = 36.

You seem to be having trouble recognizing equivalent forms.

Go to Unit 3, page 1, and learn about equivalent forms of numbers. Then return to page 1 of this Unit.

Very good!

If 4 x b = 12, then

b = 12/4 by dividing both sides by 4. Thus,

b = 3 is our final answer as 12/4 = 3.

To make sure your answer is correct, you can check it by substituting back into the original equation the value you obtained. In this problem we check our answer as follows:

4 x b = 12 (original equation)

4 x 3 = 12 (substituting our value of 3 for b)

Then 12 = 12, which is a correct statement; so our answer of 3 works.

As you can see, solving equations requires forming correct equivalent statements.

Now turn to page 27, and we'll look at another type of equation.

Correct! The value for "a" is the same in both equations.

For what value of "a" is 9 x 4 = a and a = 9 x 4 true?

(a) 36 Turn to page 10

(b) 27 Turn to page 13

(c) 45 Turn to page 18

Your answer is incorrect.

You are having trouble recognizing equivalent forms of $a = bc$.

Go to page 190 of Unit 13. When you have finished, return to page 12 of this Unit.

Correct! If 3 = b/6, then 3 x 6 = b and 18 = b.

Sometimes it is necessary to find more than one equivalent form to solve an equation. For example, to solve 15/b = 5 for b we write:

15/b = 5 (the original equation)

First Equivalent Form: 15 = 5 x b (multiplying both sides of the equation by b)

Second Equivalent Form: 15/5 = b (dividing both sides of the equation by 5)

3 = b (the equivalent form of 15/5, so b = 3 is our answer)

Checking our answer as we did before:

15/b = 5 (original equation)

15/3 = 5 (substituting our value of 3 for b)

5 = 5 (equation correct for b = 3)

continued on next page

Now you try one.

If 16/b = 2, what is the value of b?

(a) b = 4 Turn to page 24

(b) b = 8 Turn to page 21

(c) b = 2 Turn to page 26

Incorrect! The correct value for a = 9 x 4 and 9 x 4 = a is a = 36.

You seem to be having trouble recognizing equivalent forms.

Go to Unit 3, page 1, and learn about equivalent forms of numbers. Then return to page 1 of this Unit.

Very good, b = 16.

You saw that if b/4 = 4 then

b = 4 x 4 and

b = 16 is the correct answer

Sometimes it is necessary to find more than one equivalent form to solve an equation. For example, to solve 15/b = 5 for b we write:

15/b = 5 (the original equation)

First Equivalent Form: 15 = 5 x b (multiplying both sides of the equation by b)

Second Equivalent Form: 15/5 = b (dividing both sides of the equation by 5)

3 = b (the equivalent form of 15/5, so b = 3 is our answer)

Checking our answer as we did before:

15/b = 5 (Original equation)

15/3 = 5 (Substituting our value of 3 for b)

5 = 5 (Equation correct for b = 3)

(Continued on next page)

Now you try one.

If 16/b = 2, what is the value of "b"?

(a) b = 4 Turn to page 24

(b) b = 8 Turn to page 21

(c) b = 2 Turn to page 26

Your answer of (a) b = 4/12, and then as b = 1/3 is <u>incorrect</u>!

In Unit 13 you should have learned that 4 x 6 = 12 can be written as b = 12/4 by dividing both sides of the equation by 4. Remember? Thus b will now equal 3.

Try this one.

The equation b x 2 = 10 is rewritten as:

(a) b = 10/2, and then as b = 5 Turn to page 22

(b) b = 10 x 2, and then as b = 20
Turn to page 16

Excellent, b = 8!

You saw that if $16/b = 2$ then

$16 = 2 \times b$ and

$16/2 = b$ or

$8 = b$

Checking: $16/6 = 2$

$16/8 = 2$

$2 = 2$

Now turn to page 30 and continue.

Your answer of b = 10/2, and then as b = 5 is correct.

You saw that b x 2 = 10 is

b = 10/2 (dividing both sides by 2)

b = 5 (an equivalent form of 10/2)

Checking: b x 2 = 10

5 x 2 = 10

10 = 10

Good! Now turn to page 27 and continue.

No!

b/4 = 4 is written as the equivalent statement

b = 4 x 4 by multiplying both sides of the equation

by 4. Thus b = 16.

Checking, we see that: b/4 = 4 (Original equation)

16/4 = 4 (substituting 16 for "b")

4 = 4 (equation correct for b = 16)

Remember that in solving these equations we want to form correct equivalent statements.

Try another one.

If 3 = b/6, what is the value of "b"?

(a) b = 18 Turn to page 17

(b) b = 2 Turn to page 32

Incorrect! Let's take another look at the problem.

If 16/b = 2, then we want to find a value for the unknown "b" which will make the equation true.

Therefore, we multiply both sides by "b" and get 16 = 2 x b.

Next, we divide both sides by 2 and get 16/2 = b, which becomes b = 8.

Checking we see that: 16/b = 2

16/8 = 2 (substituting 8 for "b")

2 = 2 (a correct equation)

Question:

If 2 = 4/b, what is the value of "b"?

(a) 2 Turn to page 28

(b) 8 Turn to page 31

No!

b/4 = 4 is written as the equivalent statement

b = 4 x 4 by multiplying both sides of the equation

by 4. Thus b = 16.

Checking, we see that: b/4 = 4 (Original equation)

16/4 = 4 (substituting 16 for "b")

4 = 4 (equation correct for b = 16)

Remember that in solving these equations we want to form correct equivalent statements.

Try another one.

If 3 = b/6, what is the value of "b"?

(a) b = 18 Turn to page 17

(b) b = 2 Turn to page 32

Incorrect! Let's take another look at the problem.

If 16/b = 2, then we want to find a value for the unknown "b" which will make the equation true.

Therefore, we multiply both sides by "b" and get 16 = 2 x b.

Next, we divide both sides by 2 and get 16/2 = b, which becomes b = 8.

Checking, we see that: 16/b = 2

16/8 = 2 (substituting 8 for "b")

2 = 2 (a correct equation)

Question:

If 2 = 4/b, what is the value of "b"?

(a) 2 Turn to page 28

(b) 8 Turn to page 31

To solve equations of the form b/3 = 5 for "b" also requires that you form equivalent statements.

Thus b/3 = 5 is equivalent to

b = 5 x 3 by multiplying both sides of the equation by 3.

Then, b = 15 becomes our answer.

Checking: b/3 = 5 (original equation)

15/3 = 5 (substituting 15 for "b")

5 = 5 (equation correct for b = 15)

Here is another example:

b/3 = 3

b = 3 x 3

b = 9

Checking: b/3 = 3

9/3 = 3

3 = 3

(Continued on next page)

Now you try one.

If b/4 = 4, what is the value of "b"?

(a) 16 Turn to page 19

(b) 1 Turn to page 23

(c) 4 Turn to page 25

Good!

You saw that if $2 = 4/b$, then

$2 \times b = 4$ (multiplying both sides by "b")

and $b = 4/2$ (dividing both sides by 2)

or $b = 2$

What is the value of "b", if $2 = 14/b$?

(a) 7 Turn to page 34

(b) 28 Turn to page 36

Incorrect! If a = 24/4, then a = 6.

You seem to be having trouble reducing fractions.

Go to page 20 of Unit 3 and study reduction of fractions, then return to page 1 of this Unit.

Try this one.

Solve 12 = 4 x b for the value of "b".

(a) b = 4 Turn to page 38

(b) b = 3 Turn to page 44

Incorrect!

If $2 = 4/b$, then

$2 \times b = 4$ (multiplying both sides by "b")

$b = 4/2$ (dividing both sides by 2)

$b = 2$

Checking: $2 = 4/b$

$2 = 4/2$

$2 = 2$

You seem to be having trouble setting up equivalent forms.

Return to Unit 13, page 190 and review equivalent forms, then return to page 1 of this Unit.

Not quite.

The equation $3 = b/6$ becomes

$3 \times 6 = b$ when we multiply both sides by 6.

Then, $18 = b$ becomes the equivalent form of 3×6.

Checking: $3 = b/6$

$3 = 18/6$

$3 = 3$

You seem to be having trouble with this type of equation. Study the above problem carefully. Now turn to page 27 and slowly work through the examples on that page. When you feel you understand how to do this type of problem, work the problem on page 27 and continue from there.

Excellent, b = 1/3.

You have successfully finished this section of Unit 14.

Now, turn to page 50 and continue.

Very good! Your answer of 7 is correct.

Now, turn to page 30 and continue.

Correct, a = 1/8.

Try this one.

Solve for "b", if 16 = 8/b.

(a) 1/2 Turn to page 52

(b) 2 Turn to page 40

Incorrect! You seem to be pretty shaky on this type of problem. Study the following example carefully.

To solve 15/b = 5 for "b" we write:

15/b = 5 (the original equation)

First Equivalent Form: 15 = 5 x b (multiplying both sides of the equation by b)

Second Equivalent Form: 15/5 = b (dividing both sides of the equation by 5)

3 = b (the equivalent form of 15/5, so b = 3 is our answer)

Checking our answer: 15/b = 5 (original equation)

15/3 = 5 (substituting our value of 3 for b)

5 = 5 (equation correct for b = 3)

When you feel you understand this type of problem, turn to page 24 and work the problem at the bottom of the page.

Excellent, b = 2.

Solve for "a", if 3/24 = a.

(a) 1/8 Turn to page 35

(b) 8 Turn to page 49

Incorrect! "b" is equal to 3.

Let's look at the problem again.

If 12 = 4 x b, then

12/4 = b when we divide both sides by 4.

Thus, 3 = b, an equivalent form of 12/ 4.

Try this one.

Find "b", if 24 x b = 8.

(a) b = 1/3 Turn to page 42

(b) b = 3 Turn to page 46

Incorrect! If b/9 = 3, then b = 27.

Let's see why.

If b/9 = 3, then

b = 3 x 9 (multiplying both sides of the equation by 9)

b = 27 (result of 3 x 9)

Checking: b/9 = 3

27/9 = 3

3 = 3

Try this one.

For what value of "b" is 4 = b/8 correct?

(a) 2 Turn to page 41

(b) 32 Turn to page 45

Incorrect! Let's see why.

If 16 = 8/b, then

16 x b = 8 by multiplying both sides by "b".

Next, b = 8/16 when we divide both sides by 16,

and get b = 1/2 by reducing 8/16.

Checking, we see that: $16 = \frac{8}{1/2}$

16 = 8/1 x 2/1

16 = 16

Try this one.

If 6 = 18/b, find "b".

(a) 1/3 Turn to page 53

(b) 3 Turn to page 55

No! If 4 = b/8, then b = 32.

If 4 = b/8, then

8 x 4 = b (multiplying both sides by 8)

32 = b (result of multiplying 8 x 4)

Thus, 4 = 32/8

4 = 4

You seem a little shaky on this type of problem.

Return to page 27 and slowly work through the examples. When you feel ready, continue by working the problem on that page.

Good! If 24 x b = 8, then b = 1/3.

Checking: 24 x b = 8

24 x 1/3 = 8

8 = 8

What is the value of "b" in the equation b/9 = 3?

(a) b = 1/3 Turn to page 39

(b) b = 27 Turn to page 47

No! If 2 = 4/b, then b = 2. Let's see why.

If 2 = 4/b, then

2 x b = 4 (multiplying both sides by b)

b = 4/2 (dividing both sides by 2)

and b = 2, since 4/2 = 2.

Checking, we see that: 2 = 4/b

2 = 4/2

2 = 2

Try this one.

If 3/b = 6, find "b".

(a) b = 1/2 Turn to page 51

(b) b = 2 Turn to page 48

Correct! The value of "b" is 3.

What is the value of "b" in the equation b/9 = 3 ?

(a) b = 1/3 Turn to page 39

(b) b = 27 Turn to page 47

Correct! If 4 = b/8, then b = 32

Checking, we see that: 4 = b/8

4 = 32/8

4 = 4

Try this one.

For what value of "b" is the equation 2 = 4/b correct?

(a) b = 2 Turn to page 37

(b) b = 8 Turn to page 43

No! If 24 x b = 8, then

I. b = 8/24 (dividing both sides by 24)

II. b = 1/3 (reducing the fraction 8/24)

If you are having trouble with the first step on constructing equivalent forms, then return to Unit 13, page 190.

If reducing fractions, step 2, is the trouble spot, go to Unit 3, page 20, and study the material.

Return to page 12 of this Unit upon completion.

Very good! b = 27.

Try this one.

For what value of "b" is the equation 2 = 4/b correct?

(a) 2 Turn to page 37

(b) 8 Turn to page 43

Not quite!

If $3/b = 6$, then

$3 = 6 \times b$ (Multiplying both sides of the equation by "b")

$3/6 = b$ (dividing both sides of the equation by 6)

and $1/2 = b$.

Checking: $3/b = 6$

$$\frac{3}{1/2} = 6$$

$$3/1 \times 2/1 = 6$$

$$6 = 6$$

You seem to be having trouble with this type of equation.

Carefully work through the problem above. Then turn to page 24 and study the problem on that page. When you feel you are ready, continue the program by working the problem on page 24.

Wait a minute!

If 3/24 = a, how can "a" possibly be equal to 8?

3/24 reduces to 1/8!

Try this one.

Find "a" if a = 24/4.

(a) a = 1/6 Turn to page 29

(b) a = 6 Turn to page 54

Up till now we have been considering equations of the form a = bc. Now, we'll look at equations involving unknowns in the form E = IR and I = E/R.

For example:

Given that I = 5, R = 2 solve E = IR for E.

First, we must substitute into the equation the values given. Thus, E = IR becomes

E = 5 x 2 by substitution

Then, E = 10

Solve for the value of E, if E = IR and I = 6, R = 4.

(a) E = 4/6 Turn to page 62

(b) E = 24 Turn to page 60

Correct! If 3/b = 6, then b = 1/2.

You saw that: 3/b = 6, becomes

3 = 6 x b which becomes

3/6 = b

or 1/2 = b

Try this one.

Solve for "a" in 3/24 = a.

(a) 1/8 Turn to page 35

(b) 8 Turn to page 49

Very good! "b" does equal 1/2.

You have successfully completed this section of Unit 14.

Now, turn to page 50 and continue.

Your answer is incorrect!

Work through this example:

If $3/b = 6$, then

$3 = 6 \times b$ (Multiplying both sides of the equation by "b")

$3/6 = b$ (dividing both sides of the equation by 6)

and, $1/2 = b$

Checking: $3/b = 6$

$$\frac{3}{1/2} = 6$$

$3/1 \times 2/1 = 6$

$6 = 6$

You seem to be having trouble with this type of equation. Carefully work through the problem above. Then turn to page 24 and study the problem on that page. When you feel you are ready, continue the program by working the problem on page 24.

Good! If a = 24/4, then a = 6.

Try this one.

Solve for "b" if 16 = 8/b.

(a) 1/2 Turn to page 52

(b) 2 Turn to page 40

Good! b = 3.

If 6 = 18/b, then

6 x b = 18

b = 18/6

b = 3

Now try this one.

Solve for "b", if 21 = 7/b.

(a) 1/3 Turn to page 33

(b) 3 Turn to page 57

Wait a minute!

If E = IR and I = 5 and R = 3 , then substituting for I and R you should get:

E = 5 x 3

Thus, E = 15.

This is not one of the answers given. You should have chosen (c) neither of the above.

Here's another chance.

If E = IR and R = 4, I = 12, solve for E.

(a) E = 3 Turn to page 72

(b) E = 48 Turn to page 73

Incorrect!

The correct way to solve the equation 21 = 7/b is as follows:

21 = 7/b (the original equation)

21 x b = 7 (multiplying both sides of the equation by "b")

b = 7/21 (dividing both sides of the equation by 21)

b = 1/3 (writing the equivalent form of 7/21)

You seem to be having trouble with this type of equation. Study the above solution carefully, then turn to page 19 and study the example on that page. After you work through these examples continue by answering the question on page 19.

Incorrect. "I" equals 5 not 20!

This time you are solving for "I" in the equation E = IR. Given that E = 10 and R = 2, you should solve as follows:

E = IR (given equation)

10 = I x 2 (substituting the given values)

10/2 = I (dividing both sides by 2)

5 = I (equivalent form of 10/2)

Checking: E = IR

10 = 5 x 2

10 = 10 and your answer is correct.

Try this one.

Solve for "I", if E = IR and E = 4, R = 3.

(a) I = 4/3 Turn to page 70

(b) I = 3/4 Turn to page 74

Incorrect! You should have chosen I = 5/8.

Let's see why.

Given E = IR and E = 5, R = 8, then

5 = I x 8 (substituting the given values)

5/8 = I (dividing both sides by 8)

since 5/8 can't be reduced, I = 5/8 is our final answer.

Which of the following is correct for the equation E = IR?

(a) E = 3/4, I = 4, R = 3 Turn to page 75

(b) I = 2, E = 4, R = 2 Turn to page 71

Good! E = 24 when I = 6 and R = 4.

What about this one?

What is the value of E, if E = IR and R = 3, I = 5?

(a) E = 5/3 Turn to page 63

(b) E = 3/5 Turn to page 56

(c) Neither of the above Turn to page 64

Excellent, "I" does equal 5.

Try this one.

Solve for "I" given E = IR and E = 5, R = 8.

(a) I = 5/8 Turn to page 66

(b) I = 8/5 Turn to page 59

Incorrect!

In order to solve the equation E = IR for the values given, you must correctly substitute these values into the equation and solve as before. You were given the values I = 6 and R = 4.

Substituting into the equation E = IR, you should have:

E = 6 x 4, now multiplying we get

E = 24

Now try this one

Solve for "E" given E = IR and I = 9, R = 3.

(a) E = 27 Turn to page 67

(b) E = 1/3 Turn to page 69

Wait a minute!

If E = IR and I = 5 and R = 3 , then substituting for I and R you should get:

E = 5 x 3, thus

E = 15

This is not one of the answers given. You should have chosen (c) neither of the above.

Here's another chance.

If E = IR and R = 4, I = 12, solve for E.

(a) E = 3 Turn to page 72

(b) E = 48 Turn to page 73

Very good!

You saw that if E = IR, then

E = 5 x 3, and

E = 15

and (c) <u>neither</u> was the correct answer to the problem.

This time solve for "I" given E = IR and E = 10, R = 2.

(a) I = 5 Turn to page 61

(b) I = 20 Turn to page 58

Very good! R = 3

Checking your answer, we see that: I = E/R

4 = 12/3

4 = 4

Now work this one.

Given I = E/R, I = 3 and E = 5, solve for R.

(a) 3/5 Turn to page 85

(b) 5/3 Turn to page 77

Very good!

Given E = 5, R = 8, then I = 5/8.

Checking: E = IR

5 = 5/8 x 8

5 = 5

Now, turn to page 68 and keep up the good work.

Good! E = 27 if I = 9 and R = 3.

You saw that if E = IR, then

E = 9 x 3, and

E = 27

Try this one.

Solve for E, given that E = IR and R = 3, I = 5.

(a) E = 5/3 Turn to page 63

(b) E = 3/5 Turn to page 56

(c) Neither of the above Turn to page 64

Now, we want to consider equations of the form I = E/R. Notice that this equation is equivalent to E = IR only if it is written in a different form.

Question:

If I = E/R and E = 14 and R = 7 , what is the value of "I"?

(a) 1/2 Turn to page 79

(b) 2 Turn to page 76

No! Your answer is incorrect.

Choose the one which fits your problem the best.

(a) I do not understand substitution, that is, replacing a letter by a number in order to solve the equation -- Turn to page 1 of Unit 2.

(b) I do not understand how to solve for E in the equation E = IR -- Turn to page 1 of this Unit.

If (a) is your choice, return to page 50 of this Unit after completing Unit 2.

Excellent! You are on the ball. "I" does equal 4/3.

Do this one.

Solve for "I", given E = IR and E = 5, R = 8.

(a) I = 5/8 Turn to page 66

(b) I = 8/5 Turn to page 59

Good! You chose the relationship: I = 2, E = 4, R = 2.

Checking: E = IR

4 = 2 x 2 (substitution of the given values)

4 = 4

and we see that your answer is correct.

Now, turn to page 68 and continue.

You have gone astray!

If you are given E = IR and values for "I" and "R", then the problem becomes the same as solving a = bc for "a" given values for b and c.

You should be able to do this type of problem.

Return to page 50 and look at the example again. Continue this Unit by answering the question on the bottom of page 50.

Good! E does equal 48 if R = 4 and I = 12.

You saw that if E = IR, then

E = 12 x 4, and

E = 48

Checking: E = IR

48 = 12 x 4

48 = 48

This time solve for "I", given E = IR and E = 10, R = 2.

(a) I = 5 Turn to page 61

(b) I = 20 Turn to page 58

Your answer is incorrect!

You are having trouble solving E = IR for "I", when given values for E and R. This type of problem is the same as solving a = bc for b given values for a and c.

Return to page 12 and study the material on that page. When you are ready, continue by working the problem on the bottom of that page.

No! Your choice of E = 3/4, I = 4, R = 3 is incorrect.

Let's see why they won't work.

Given E = IR and then substituting the values, we get

3/4 = 4 x 3 which we can see is not a true statement, as 4 x 3 equals 12 not 3/4.

You seem to be having trouble with the substitution of the values into the equation E = IR.

Go to page 1 of Unit 2 and learn about representing numbers by letters. When you have finished, return to page 50 of this Unit.

Very good! "I" does equal 2.

Checking: If I = E/R, E = 14 and R = 7, then

2 = 14/7

2 = 2

Question:

If I = E/R and I = 4 and R = 8 , what is the value of E?

(a) E = 2 Turn to page 86

(b) E = 32 Turn to page 78

Excellent! You have now shown that you understand the ideas of this unit. Let's review what we have done:

1. You have learned how to solve the equation a = bc for any one letter given positive integral values for the other two.

2. You have learned how to solve the equations E = IR and I = E/R for any one letter given positive integral values for the other two.

You are now ready to take a test on this Unit. Tell your teacher that you have completed Unit 14.

Correct! E does equal 32.

Checking: I = E/R

4 = 32/8

4 = 4

Very good! Now try this one.

Given I = E/R, I = 4 and E = 12, solve for R.

(a) R = 3 Turn to page 65

(b) R = 48 Turn to page 84

No, you "goofed" somewhere. The correct answer is I = 2.

Let's find out why.

Given I = E/R and E = 14 and R = 7 , then upon substituting these values, you should have I = 14/7. Now solving we get I = 2.

Try this one.

Solve for "I", given I = E/R, R = 5 and E = 3.

(a) 5/3 Turn to page 81

(b) 3/5 Turn to page 83

Excellent! You have now shown that you understand the ideas of this Unit. Let's review what we have done:

1. You have learned how to solve the equation a = bc for any one letter given positive integral values for the other two.

2. You have learned how to solve the equations E = IR and I = E/R for any one letter given positive integral values for the other two.

You are now ready to take a test on this Unit. Tell your teacher that you have completed Unit 14.

Your answer of 5/3 is incorrect!

You are having trouble substituting correctly. Go to page 1 of Unit 2 and work the problems on substituting numbers into an equation.

After completing Unit 2, return to page 50 of this Unit.

Incorrect! E does <u>not</u> equal 1.

Given I = E/R, R = 3 and I = 3, then

3 = E/3 by substitution

Then 3 x 3 = E by multiplying both sides by 3.

Thus, E = 9.

Solving equations of this type is the same as solving an equation like 4 = b/2 which you did earlier.

Return to page 27 and review this method. Continue the program by working the problem at the bottom of page 27.

Very good! You substituted correctly and found

I = 3/5.

Now try this one.

If I = E/R and I = 4 and R = 8 , what is the value of E?

(a) E = 2 Turn to page 86

(b) E = 32 Turn to page 78

No! R equals 3. Let's see why.

We start with the equation I = E/R, I = 4 and E = 12.

Substituting, we see that:

I = E/R becomes

4 = 12/R

Now, 4 x R = 12 by multiplying both sides by R.

Then R = 12/4 by dividing both sides by 4.

Thus R = 3

Checking: I = E/R

4 = 12/3

4 = 4 and the equation is correct for R = 3.

Solve for R given I = E/R, E = 10 and I = 11.

(a) 10/11 Turn to page 89

(b) 11/10 Turn to page 87

Incorrect! R is equal to 5/3 <u>not</u> 3/5.

If I = E/R, I = 3 and E = 5, then

3 = 5/R by substitution of the given values, then

3 x R = 5 by multiplying both sides by R, and

R = 5/3 by dividing both sides of the equation by 3.

Try this one.

Given I = E/R, E = 12 and R = 4, what is the value of R?

(a) R = 3 Turn to page 92

(b) R = 4 Turn to page 90

No! You chose E = 2. Let's see the correct way of working the problem.

If I = E/R and I = 4 and R = 8 , then

4 = E/8 by substitution. Next we get:

4 x 8 = E by multiplying both sides by 8, then

32 = E, the result of multiplication.

Checking: I = E/R

4 = 32/8

4 = 4 and the equation is correct for E = 32.

Given I = E/R and R = 3, I = 3, solve for E.

(a) 1 Turn to page 82

(b) 9 Turn to page 88

Not quite! R is equal to 10/11.

You are having trouble solving for R in I = E/R, given values for E and I. This type of problem is the same as solving a problem like 6 = 3/b.

Return to page 24 and review how to solve this type of problem. Continue in this Unit by working the problem on page 24.

Very good! E does equal 9.

You saw that if I = E/R and I = 3 and R = 3 , then

3 = E/3 by substitution, and

3 x 3 = E, thus

9 = E

Checking: If I = E/R

3 = 9/3

3 = 3 and the equation is correct for E = 9.

Try this one. Be careful now.

Given I = E/R, I = 4 and E = 12, solve for R.

(a) R = 3 Turn to page 65

(b) R = 48 Turn to page 84

Very good! R does equal 10/11.

You saw that if I = E/R, I = 11 and E = 10, then

11 = 10/R, or

11 x R = 10 which becomes

R = 10/11

Try this one.

Given I = E/R, I = 3 and E = 5, solve for R.

(a) 3/5 Turn to page 85

(b) 5/3 Turn to page 77

Excellent! You saw that I had already given you the answer: that R = 4.

What about this one?

Solve for R if I = E/R, E = 3 and I = 7.

(a) R = 3/7 Turn to page 80

(b) R = 7/3 Turn to page 91

Now wait a minute! You should have it by now.

If I = E/R with E = 3 and I = 7, then substituting these values into the equation we get:

$7 = 3/R$

$7 \times R = 3$

$R = 3/7$

You are having trouble solving for R in I = E/R, given values for E and I. This type of problem is the same as solving a problem like 6 = 3/b.

Return to page 24 and review how to solve this type of problem. Continue in this Unit by working the problem on page 24.

Oh - oh! Got you there. R does <u>not</u> equal 3.

R is equal to 4. Why?

Reread the problem:

"Given I = E/R, E = 12 and R = 4, what is the value of R?"

I have already given you the value for R, it is 4.

BE ALERT.

Return to page 85 and choose the correct answer.

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CAI MATHEMATICS

TEST QUESTIONS

UNIT 14 - SOLUCTIONS OF A=BC

Directions: The correct answer will always be expressed in lowest terms.

1. Which of the below is the correct value for "a" in the equation a=10/2?

   a) (a) a=2

   b) (b) a=5

   c) (c) a=1/5

2. In solving 3 x 6 = 9 for "6", we rewrite the equation as

   a) b=3/9and then as 1/3

   b) b=3x9 and then as 27

   c) b=9/3 and then as 6=3

3. If 16/6=2, what is the value of 6?

   a) 4

   b) 8

   c) 2

4. Solve for "a", if 3/24=a

   a) a=1/8

   b) a=8

   c) a=72

5. What is the value of E if E=IR and R=3, I=5?

   a) E=5/3

   b) E=3/5

   c) neither of the above

6. What is the correct value of "a" in the equation a=12/6?

   a) a=1/2

   b) a=2

   c) a=4/2

7. The equation bx2 = 8 is rewritten as

   a) b=8x2 and then as b=16

   b) b=8/2, and then as b=4

   c) b=2/8, and then as b=1/4

8. Solve 15= 5x6 for the value of 6

   a) b=3

   b) b=1/3

   c) b=75

9. Find "9" if a=24/2

   a) 1/12

   b) 48

   c) 12

10. Solve for I given E=IR and E=10, R=2

   a) I=20

   b) I=1/5

   c) I=5

11. Is the value of "a" in 8x3= a the same as the value of "a" in a = 8x3

   a) yes

   b) no

12. If b=3, then the equation 4xb=12 could be written as

   a) 4x3/4=12

   b) 4x48=12

   c) 4x3=12

13. What is the value of "b" in the equation b/7=3

a) 21

b) 3

c) 15

14. Solve for "b" if 18=9/b

a) 1/2

b) 2

c) 3b

15. Solve for "I" given E=IR and E=3,R=7

a) I=3

b) I=7/3

c) I=3/7

16. The value for "a" in 8/4=a and a=8/4 is

a) The same value

b) not the same value

17. If b/4=4 What is the value of b

a) 1

b) 16

c) 4

18. For what value of "b" is 4=b/10 correct?

a) 40

b) 33

c) 44

19. If E=IR I=6 R=4 Solve for E

a) E=2/3

b) E=24

c) E=3/2

20. Are I=E/R and E=IR Equivalent forms of the same equations

a) yes

b) no

21. What is the value of "a" in a=9x4

a) 45

b) 27

c) 36

22. If 3=b/6 what is the value of b

a) b=18

b) b=2

c) b=12

23. For what value of "b" is the equation 2=12/b correct?

a) 8

b) 6

c) 4

24. Solve for "E" given E=IR and I=9, R=3

a) E=3/9

b) E=1/3

c) E=27

25. If R=E/1 and E=8 and I=7 what does R equal

a) R=7/8

b) R=1

c) R=8/7

ANSWER SHEET

UNIT 14 - SOLUTIONS OF A=BC

1. b
2. c
3. b
4. a
5. c
6. b
7. b
8. a
9. c
10. c
11. a
12. c
13. a
14. a
15. c
16. a
17. b
18. a
19. b
20. a
21. c
22. a
23. b
24. c
25. c

* To the instructor: All of the questions above are related to the one objective of this course.

ANSWER SHEET

UNIT 14 - SOLUTIONS OF A=BC

1. b
2. c
3. b
4. a
5. c
6. b
7. b
8. a
9. c
10. c
11. a
12. c
13. a
14. a
15. c
16. a
17. b
18. a
19. b
20. a
21. c
22. a
23. b
24. c
25. c

* To the instructor: All of the questions above are related to the one objective of this course.